



April 14, 2014

Ms. Katharine K. Buckner
Sandhills and Pulp & Paper Permitting Section
Engineering Services Division
Bureau of Air Quality
South Carolina Department of Health and Environmental Control
2600 Bull Street
Columbia, South Carolina 29201-1708

Re: Resolute FP US Inc.
Construction Permit Application
Industrial Boiler MACT Modifications – No. 1 and No. 2 Combination Boilers

Dear Ms. Buckner:

On behalf of Resolute FP US Inc., please find the attached construction permit application for modifications to the No. 1 and No. 2 Combination Boilers to comply with the Industrial Boiler MACT.

If you have any questions, require further clarification, or need additional information regarding the attached application, please do not hesitate to contact me.

Sincerely,

A handwritten signature in black ink, reading "Steven R. Moore".

Steven R. Moore
URS Corporation

Attachment

cc: Mr. Dale Herendeen – Resolute FP US Inc.

URS

Environmental
Services

GREENVILLE



**Construction Permit Application
Industrial Boiler MACT Modifications
Combination Boiler No. 1 and No. 2**

April 2014



resolute

Forest Products



Catawba Mill

1.0 Introduction

Resolute FP US, Inc. (Resolute) operates a pulp and paper mill located in Catawba, South Carolina. Resolute plans to modify the existing No. 1 and No. 2 Combination Boilers at the Catawba Mill to comply with the National Emission Standards for Hazardous Air Pollutants (NESHAP) from Industrial, Commercial, and Institutional Boilers and Process Heaters (Industrial Boiler MACT - 40 CFR Part 63, Subpart DDDDD).

2.0 Project Description

The No. 1 and No. 2 Combination Boilers are currently permitted to burn biomass, tire-derived fuel (TDF), residual fuel oil, specification used oil, and natural gas. The Combination Boilers are also control devices used to burn the non-condensable gases (NCG's) generated by the Kraft pulp mill for compliance with the Pulp and Paper NESHAP (40 CFR Part 63, Subpart S) and the Kraft pulp mill New Source Performance Standards (40 CFR 60, Subpart BB).

The Industrial Boiler MACT emission limits and work practice standards vary depending on the applicable sub-category of each boiler. The primary fuel for the No. 1 and No. 2 Combination Boilers is wet biomass. Both of these sources were classified as "hybrid suspension grate" boilers by the South Carolina Department of Health and Environmental Control on October 13, 2013. This project will not change the fuels fired or the design of the boilers.

This project will upgrade the emission controls on each boiler to ensure compliance with the applicable Industrial Boiler MACT emission limits for boilers in the hybrid suspension grate sub-category. The planned changes to each combination boiler include upgrading the existing over-fire air (OFA) system and the existing multi-clone dust collectors.

The OFA system will be upgraded to provide more reliable and consistent combustion control to maintain compliance with the applicable CO emission limit. The OFA upgrades may include new OFA air nozzles, a new OFA booster fan, new air-swept fuel spouts, and the associated piping, dampers, motors, etc. to more precisely control the air distribution within each boiler. The new air-swept fuel spouts will also allow a more uniform fuel distribution across the grate, further improving combustion.

Each existing multi-clone will be upgraded to maintain particulate matter and opacity emissions below the level required from hybrid suspension grate boilers. The upgrade may include installing larger tubes in the existing multi-clone or replacing the multi-clone if necessary. The OFA system upgrade is also expected to reduce carry-over of particulate matter from each boiler into its downstream multi-clone and electro-static precipitator (ESP).

Modifications to each existing ESP may be required in a subsequent project if the planned modifications to the combustion air and multi-clone systems do not demonstrate compliance with the applicable particulate matter and opacity emission limits.

The project will not change the maximum or actual amount of biomass, TDF, natural gas, residual oil, or specification used oil fired by the No. 1 and No. 2 Combination Boilers. There are no changes planned to the combustion grate, the natural gas burners, or the residual oil burners, and no increase in the maximum heat input capacity for any fuel.

3.0 Emission Calculations

The emissions from the No. 1 and No. 2 Combination Boilers are based on engineering stack test data conducted to evaluate Industrial Boiler MACT and AP-42 emission factors for pollutants where stack testing has not been performed. A summary of the stack test results for each combination boiler are presented in Appendix B. The emission factors and annual emissions are summarized in Table 1 below.

Table 1
Emission Factors and Annual Emissions Summary

Pollutant	No. 1 Combination Boiler				No. 2 Combination Boiler				Total Emissions (tpy)
	Emission Factor		Annual* Heat Input (MMBtu/yr)	Actual Emissions (tpy)	Emission Factor		Annual* Heat Input (MMBtu/yr)	Actual Emissions (tpy)	
	(lb/MMBtu)	Reference			(lb/MMBtu)	Reference			
PM	0.27	Test	2,504,956	338	0.23	Test	3,341,062	384	722
PM ₁₀	0.20	AP-42**	2,504,956	250	0.17	AP-42**	3,341,062	285	535
PM _{2.5}	0.18	AP-42**	2,504,956	219	0.15	AP-42**	3,341,062	249	468
CPM	0.017	AP-42**	2,504,956	21	0.017	AP-42**	3,341,062	28	50
SO ₂	0.91	Test	2,504,956	1,140	0.77	Test	3,341,062	1,286	2,426
NO _x	0.31	Test	2,504,956	388	0.29	Test	3,341,062	484	873
CO	0.47	Test	2,504,956	589	0.91	Test	3,341,062	1,520	2,109
VOC	0.017	AP-42**	2,504,956	21	0.017	AP-42**	3,341,062	28	50
Pb	4.80E-05	AP-42**	2,504,956	0.06	4.80E-05	AP-42**	3,341,062	0.08	0.14
	kg/MMBtu				kg/MMBtu				
CO ₂	93.8	MRR**	2,504,956	259,000	93.8	MRR**	3,341,062	345,449	604,449
CH ₄	0.032	MRR**	2,504,956	88	0.032	MRR**	3,341,062	118	206
N ₂ O	0.0042	MRR**	2,504,956	12	0.0042	MRR**	3,341,062	15	27
CO ₂ mass				259,100				345,583	604,683
CO ₂ equiv.				264,665				353,005	617,670

* Actual annual heat input January 2012 - December 2013.

**Biomass factors (PM₁₀ and PM_{2.5} by ratio of AP-42 factors).

4.0 Regulatory Applicability

4.1 SC Reg. 61-62.1, Section II – Permit Requirements

South Carolina Regulation 61-2.1, Section II.A.1.a requires sources to obtain a construction permit from the Department prior to any construction, alteration, or addition to a source of air contaminants, including control devices. Section II.A.1.b allows the Department to grant permission to proceed with minor alterations or additions to sources of air contaminants without issuance of a construction permit when the Department determines the alteration or addition will not increase the quantity or alter the character of the source's emissions.

Resolute believes this project qualifies for the exemption from construction permitting. This project is consistent with the exemption criteria in Section II.B.5 and the construction permit exemption criteria in the November 2, 2011 guidance "Like-for-Like replacement of equipment and control device(s) at Prevention of Significant Deterioration (PSD) Major Sources."

Resolute requests an exemption from the requirement to obtain a construction permit for this project. Resolute has prepared this construction permit application which addresses all the exemption criteria. However, Resolute has also included signed permit application forms in case the Department determines a construction permit is required.

4.2 SC Reg. 61-62.5, Standard No. 1 – Emissions from Fuel Burning Operations

The No. 1 and No. 2 Combination Boilers are currently subject to the following Standard No. 1 emission limits for Opacity, PM, and SO₂:

- Opacity not to exceed 40% (except for 6-minutes per hour and 24-minutes per day)
- PM ≤ 0.6 lb/MMBtu heat input
- SO₂ ≤ 3.5 lb/MMBtu heat input

The No. 1 and No. 2 Combination Boilers are currently subject to Standard No. 1 opacity monitoring requirements. The OFA system and multi-clone upgrades will not change the existing Standard No. 1 emission limits or the opacity monitoring requirements.

4.3 SC Reg. 61-62.5, Standard No. 5.2 – Control of Oxides of Nitrogen (NO_x)

The OFA system upgrade involves modernizing the combustion air delivery system to improve combustion control and lower emissions. The OFA system upgrade does not involve any changes to the combustion grate, the natural gas burners, the residual oil burners, or the NCG burners. The OFA system upgrade meets the exemption criteria specified in Standard 5.2, Section I(a)(2) for burner heads, nozzles, and windboxes.

4.4 SC Reg. 61-62.5, Standard No. 2 – Ambient Air Quality Standards

The previously modeled emission rates of PM/PM₁₀/PM_{2.5} are based on the current state allowable emission limit of 0.6 lb/MMBtu. The applicable Industrial Boiler MACT emission limit is 0.44 lb/MMBtu, resulting in future PM/PM₁₀/PM_{2.5} emission rates lower than previously modeled. The emissions of SO₂, NO_x, and lead from the No. 1 and No. 2 Combination Boilers are expected to remain unchanged as a result of the project. Therefore, air dispersion modeling for Standard No. 2 is not being submitted at this time.

The CO emissions from the No. 1 and No. 2 Combination Boilers are expected to decrease as a result of the project. However, the average CO emissions from the No. 2 Combination Boiler are higher than previously modeled. A review of the current CO modeling analysis on file with the Department (April 2005) demonstrates compliance with the National Ambient Air Quality Standards for CO with an ample margin of compliance.

The modeled CO emission rate for the No. 1 Combination Boiler was 235 lb/hr compared to the average CO emission rate of 172 lb/hr. The actual CO emissions from the No. 1 Combination Boiler ranged between 80 lb/hr and 400 lb/hr. The modeled CO emission rate for the No. 2 Combination Boiler was 298 lb/hr compared to the average CO emission rate of 466 lb/hr. The actual CO emissions from the No. 2 Combination Boiler ranged between 118 lb/hr and 948 lb/hr.

The actual CO emissions are quite variable and may be as much as four times higher than previously modeled from the No. 1 and No. 2 Combination Boilers. However, the April 2005 air dispersion modeling analysis indicated a very large margin of compliance. As shown in Table 2 below, the maximum modeled CO concentrations can be multiplied by a factor of four, and still demonstrate a significant compliance margin of 75% or more. Therefore, air dispersion modeling for Standard No. 2 is not being submitted at this time.

Table 2
Carbon Monoxide Air Dispersion Modeling Summary

Averaging Period	2005 Maximum Concentration (µg/m ³)	2014 Adjusted Concentration (µg/m ³)	DHEC Background Concentration (µg/m ³)	2014 Total Concentration (µg/m ³)	NAAQS (µg/m ³)
1-hour	693	2,772	1,870	4,642	40,000
8-hour	273	1,092	1,374	2,466	10,000

4.5 SC Reg. 61-62.5, Standard No. 7 – Prevention of Significant Deterioration Permit Requirements

The proposed modifications to the OFA System and multi-clone on each combination boiler are expected to decrease the PM/PM₁₀/PM_{2.5} and CO emissions from current levels to ensure compliance with the Industrial Boiler MACT emission limits. There are no increases in biomass, natural gas, residual oil, specification used oil, or TDF firing as a result of the project. As a result, there are no anticipated increases in emissions of SO₂, NO_x, or lead due to the project.

The PSD applicability was determined using the actual-to-projected actual applicability test of Standard No. 7(a)(2)(c). The baseline actual emissions are for the period January 2012 through December 2013 as defined in Standard No. 7(b)(4). The projected actual emissions assume the average emission factors and heat input during the baseline period remain unchanged following the project. Therefore, the actual and projected actual emissions are identical and there is no emissions increase for any PSD pollutant.

The detailed calculations are provided in Attachment B, along with an example calculation.

Table 3
PSD Applicability Summary

Pollutant	No. 1 Combination Boiler			No. 2 Combination Boiler			Total Emission Increase (tpy)	PSD Threshold (tpy)	Is PSD Triggered? (yes/no)
	Baseline* Emissions (tpy)	Projected Emissions (tpy)	Emission Increase (tpy)	Baseline* Emissions (tpy)	Projected Emissions (tpy)	Emission Increase (tpy)			
PM	338	338	0	384	384	0	0	25	No
PM ₁₀	250	250	0	285	285	0	0	15	No
PM _{2.5}	219	219	0	249	249	0	0	10	No
CPM	21	21	0	28	28	0	0	**	No
SO ₂	1,140	1,140	0	1,286	1,286	0	0	40	No
NO _x	388	388	0	484	484	0	0	40	No
CO	589	589	0	1,520	1,520	0	0	100	No
VOC	21	21	0	28	28	0	0	40	No
Pb	0.06	0.06	0	0.08	0.08	0	0	0.6	No
CO ₂	259,000	259,000	0	345,449	345,449	0	0		No
CH ₄	88	88	0	118	118	0	0		No
N ₂ O	12	12	0	15	15	0	0		No
CO ₂ mass	259,100	259,100	0	345,583	345,583	0	0	75,000	No
CO ₂ equiv.	264,665	264,665	0	353,005	353,005	0	0	75,000	No

* Baseline emissions January 2012 - December 2013.

** CPM is added to PM₁₀ and PM_{2.5} to determine PSD applicability, for this project all PM emissions are reductions.

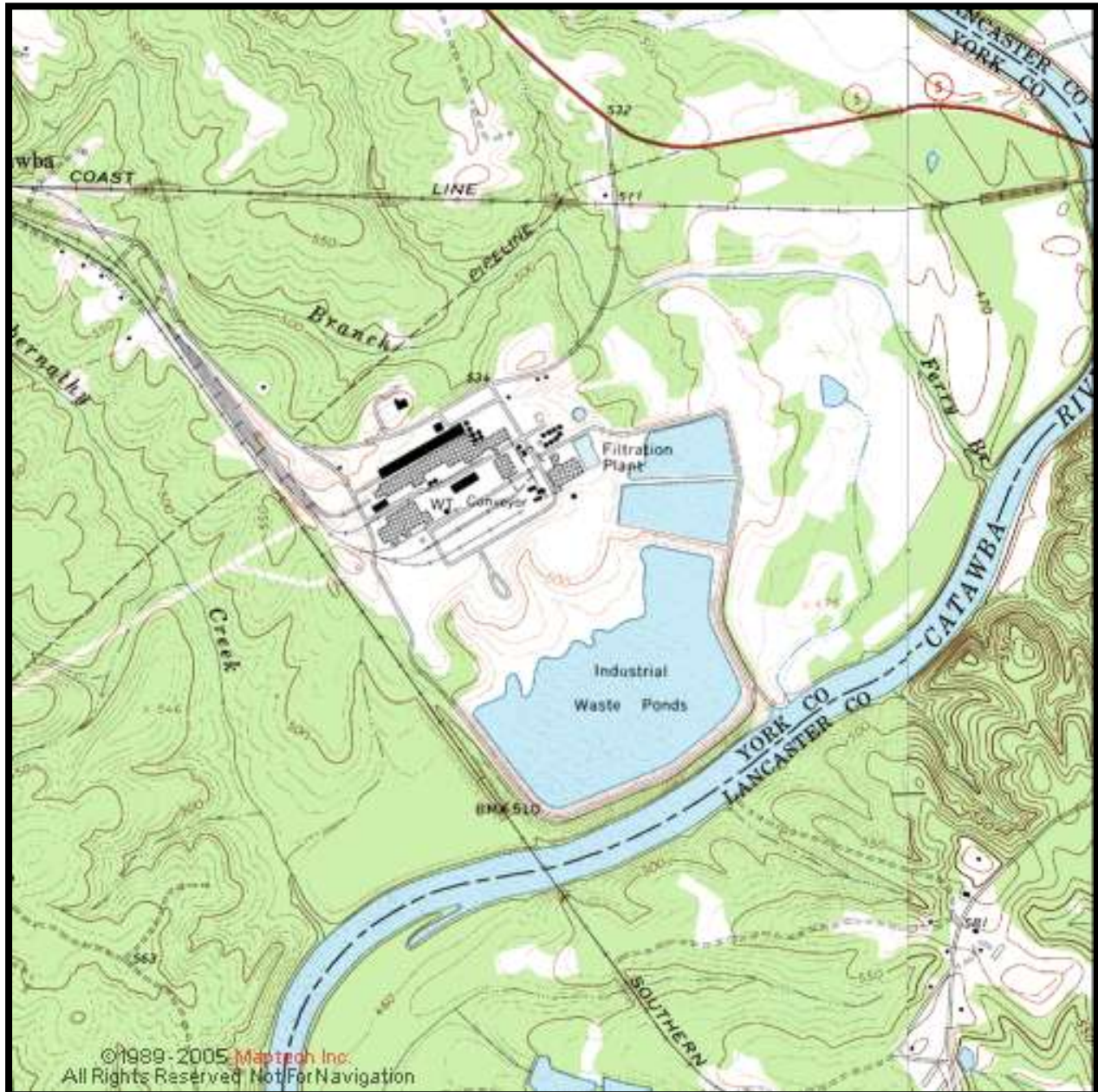
4.6 SC Reg. 61-62.5, Standard No. 8 – Toxic Air Pollutants

Standard No. 8 does not apply to fuel burning sources or sources subject to a MACT standard. Therefore, Standard No. 8 does not apply to the No. 1 and No. 2 Combination Boilers.

**4.7 40 CFR 60, Subpart D – Standards of Performance for Fossil-Fuel-Fired Steam Generators and
40 CFR 60, Subpart Db – Standards of Performance for Industrial-Commercial-Institutional
Steam Generating Units**

The No. 1 and No. 2 Combination Boilers were constructed in 1959 and 1968 respectively, prior to the applicability date of New Source Performance Standards (NSPS) Subpart D and Subpart Db. The NSPS definition of modification at §60.14(e)(5) includes an exemption for “the addition or use of any system or device whose primary function is the reduction of air pollutants, except when an emission control system is removed or is replaced by a system which the Administrator determines to be less environmentally beneficial.” This project is being done solely for Industrial Boiler MACT compliance and therefore is not an NSPS modification because it is environmentally beneficial by its very nature. The emissions of PM, SO₂, and NO_x from the No. 1 and No. 2 Combination Boilers are expected to remain unchanged or decrease as a result of the project. Therefore, NSPS Subpart D and Db are not applicable.

Figure 1
USGS MAP
Resolute FP US, Inc. – Catawba Mill



ATTACHMENT A
APPLICATION FORMS



**Bureau of Air Quality
Construction Permit Application
Facility Information
Page 1 of 2**

A. FACILITY IDENTIFICATION	
1. SC Air Permit Number (8-digits only): 2440 - 0005	2. Application Date: April 14, 2014
3. Facility Name: Resolute FP US, Inc.	4. Facility Federal Tax Identification No.:

B. FACILITY PHYSICAL ADDRESS	
1. Physical Address: 5300 Cureton Ferry Road	2. County: York
3. City: Catawba	4. Zip Code: 29704
5. Facility Coordinates (Facility coordinates should be based at the front door or main entrance of the facility.)	
Latitude: 34° 50' 39"	Longitude: 80° 53' 26" <input type="checkbox"/> NAD27 or <input checked="" type="checkbox"/> NAD83

C. CO-LOCATION DETERMINATION	
Are there other facilities in close proximity that could be considered co-located? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes*	
List potential co-located facilities, including air permit numbers if applicable:	
If applicable, location in application for co-location determination:	
(*If yes, please submit co-location applicability determination details in an attachment to this application.)	

D. CONFIDENTIAL INFORMATION / DATA	
Does this application contain confidential information or data? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes**	
(**If yes, include a sanitized version of the application for public review.)	

E. COMMUNITY OUTREACH	
What are the potential air issues and community concerns?	
No issues or concerns based on emission levels and previous air dispersion modeling results.	

F. FACILITY'S PRODUCTS / SERVICES	
1. Primary Products / Services: Coated Paper and Market Pulp	
2. Primary SIC Code: 2611, 2621	3. Primary NAICS Code: 322122, 322121
4. Other Products / Services:	
5. Other SIC Code(s):	6. Other NAICS Code(s):

G. AIR PERMIT FACILITY CONTACT			
(Person at the facility who can answer technical questions about the facility and permit application.)			
Title/Position: Environmental Manager	Salutation: Mr.	First Name: Dale	Last Name: Herendeen
Mailing Address: PO Box 7			
City: Catawba	State: SC	Zip Code: 29704	
E-mail Address: dale.herendeen@resolutefp.com	Phone No.: (803) 981-8009	Cell No.:	
One hard copy of the signed permit will be mailed to the designated Air Permit Contact. If additional individuals need electronic copies of the permit, please provide their names and e-mail addresses.			
Name		E-mail Address	
Steven Moore		steven.moore@urs.com	



Bureau of Air Quality
Construction Permit Application
Facility Information
Page 2 of 2

H. LIST OF FORMS INCLUDED	
Form Name	Included (Y/N)
Equipment/Processes (DHEC Form 2567)	<input checked="" type="checkbox"/> Yes
Control Devices (DHEC Form 2568)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Emissions (DHEC Form 2569)	<input checked="" type="checkbox"/> Yes
Regulatory Review (DHEC Form 2570)	<input checked="" type="checkbox"/> Yes
Modeling Information (DHEC Form 2573)	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No (Previously modeled emission rates higher than proposed project)
Expedited Review Request (DHEC Form 2212)	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

I. OWNER OR OPERATOR			
Title/Position: General Manager	Salutation: Mr.	First Name: Patrick	Last Name: Moore
Mailing Address: PO Box 7			
City: Catawba	State: SC	Zip Code: 29704	
E-mail Address: patrick.moore@resoluteftp.com	Phone No.: (803) 981-8376	Cell No.:	
OWNER OR OPERATOR SIGNATURE			
I certify, to the best of my knowledge and belief, that no applicable standards and/or regulations will be contravened or violated. I certify that any application form, report, or compliance certification submitted in this permit application is true, accurate, and complete based on information and belief formed after reasonable inquiry. I understand that any statements and/or descriptions, which are found to be incorrect, may result in the immediate revocation of any permit issued for this application.			

Signature of Owner or Operator

Date

J. PERSON AND/OR FIRM THAT PREPARED THIS APPLICATION			
(If not the same person as the Professional Engineer who has reviewed and signed this application.)			
Consulting Firm Name: URS Corporation			
Title/Position: Project Manager	Salutation: Mr.	First Name: Steven	Last Name: Moore
Mailing Address: 128 Millport Circle			
City: Greenville	State: SC	Zip Code: 29607	
E-mail Address: steven.moore@urs.com	Phone No.: (864) 527-4734	Cell No.:	
SC Professional Engineer License/Registration No. (if applicable):			

K. PROFESSIONAL ENGINEER INFORMATION			
Consulting Firm Name: URS Corporation			
Title/Position: Engineer	Salutation: Ms.	First Name: Amy	Last Name: Marshall
Mailing Address: 1600 Perimeter Park Drive, Suite 400			
City: Morrisville	State: NC	Zip Code: 27560	
E-mail Address: amy.marshall@urs.com	Phone No.: (919) 461-1251	Cell No.:	
SC License/Registration No.: 22147			
PROFESSIONAL ENGINEER SIGNATURE			
I have placed my signature and seal on the engineering documents submitted, signifying that I have reviewed this construction permit application as it pertains to the requirements of South Carolina Regulation 61-62, Air Pollution Control Regulations and Standards.			

Signature of Professional Engineer

Date



**Bureau of Air Quality
Construction Permit Application
Equipment / Processes
Page 1 of 1**

A. APPLICATION IDENTIFICATION

1. Facility Name: Resolute FP US, Inc.		
2. SC Air Permit Number (8-digits only): 2440 - 0005	3. Application Date: April 14, 2014	

B. PROJECT DESCRIPTION

Brief Project Description (What, why, how, etc.): Industrial Boiler MACT Compliance Project

C. ATTACHMENTS

1. <input type="checkbox"/> Process Flow Diagram	2. Location in Application:
3. <input checked="" type="checkbox"/> Detailed Project Description	4. Location in Application: Document

D. EQUIPMENT / PROCESS INFORMATION

1. Equipment ID / Process ID	2. Action	3. Equipment / Process Description	4. Maximum Design Capacity (Units)	5. Fuels Combusted	6. Control Device ID(s)	7. Emission Point ID(s)	8. Raw Material(s)	9. Product(s)	10. Pollutant(s)/ Parameter(s) Monitored	11. Monitoring Frequency	12. Reporting Frequency	13. Monitoring / Reporting Basis
2605	modify	No.1 Combination Boiler	392-405 MMBtu/hr	Biomass, TDF, Residual Oil, Natural Gas, Specification Used Oil	2605C 2610C1	2610S1	Water	Steam	Opacity	Continuous	Quarterly	Std. 1/ Title V
3705	modify	No. 2 Combination Boiler	420-710 MMBtu/hr	Biomass, TDF, Residual Oil, Natural Gas, Specification Used Oil	3705C 2610C2	2610S2	Water	Steam	Opacity	Continuous	Quarterly	Std. 1/ Title V



Bureau of Air Quality
Construction Permit Application
Control Devices
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A. APPLICATION IDENTIFICATION

1. Facility Name: Resolute FP US, Inc.	
2. SC Air Permit Number (8-digits only): 2440 - 0005	3. Application Date: April 14, 2014

B. CONTROL DEVICE INFORMATION

1. Control Device ID	2. Action	3. Pollutants Controlled (Include CAS#)	4. Control Device Description	5. Maximum Design Capacity (Units)	6. Fuels Combusted	7. Inherent/ Required/ Voluntary (Explain)	8. Capture System Efficiency and Description	9. Destruction/ Removal Efficiency Determination	10. Pollutant(s)/ Parameter(s) Monitored	11. Averaging Period(s)	12. Monitoring Frequency	13. Reporting Frequency	14. Monitoring/ Reporting Basis
CD – 2605C	Modify	PM/ PM ₁₀ /PM _{2.5}	multi-clone	296,000 acfm	NA	inherent	> 99.9 closed duct	85/75/50 AP-42	NA	NA	NA	NA	NA
CD – 2610C1	Modify	PM/ PM ₁₀ /PM _{2.5}	multi-clone	394,000 acfm	NA	inherent	> 99.9 closed duct	85/75/50 AP-42	NA	NA	NA	NA	NA
CD – 3705C	Modify	PM/ PM ₁₀ /PM _{2.5}	ESP	296,000 acfm	NA	required	> 99.9 closed duct	99.5/99/95 AP-42	Opacity	6-min	COMS	Quarter	Std. 1/ Title V
CD – 2610C2	Modify	PM/ PM ₁₀ /PM _{2.5}	ESP	394,000 acfm	NA	required	> 99.9 closed duct	99.5/99/95 AP-42	Opacity	6-min	COMS	Quarter	Std. 1/ Title V
CD -													
CD -													
CD -													
CD -													
CD -													
CD -													



Bureau of Air Quality
Construction Permit Application
Emissions
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A. APPLICATION IDENTIFICATION

1. Facility Name: Resolute FP US, Inc.	
2. SC Air Permit Number (8-digits only): 2440 - 0005	3. Application Date: April 14, 2014

B. ATTACHMENTS

1. <input checked="" type="checkbox"/> Sample Calculations, Emission Factors Used, etc.	2. <input checked="" type="checkbox"/> Detailed Explanation of Assumptions, Bottlenecks, etc.
3. <input type="checkbox"/> Supporting Information: Manufacturer's Data, etc.	4. <input type="checkbox"/> Source Test Information
5. <input type="checkbox"/> Details on Limits Being Taken for Limited Emissions	6. <input checked="" type="checkbox"/> NSR Analysis

C. SUMMARY OF PROJECTED CHANGE IN FACILITY WIDE POTENTIAL EMISSIONS

(Calculated at maximum design capacity.)

1. Pollutants	2. Emission Rates Prior to Construction / Modification (tons/year)			3. Emission Rates After Construction / Modification (tons/year)		
	Uncontrolled	Controlled	Limited	Uncontrolled	Controlled	Limited
Particulate Matter (PM)	124,478	1,861	NA	124,478	1,861	NA
Particulate Matter <10 Microns (PM ₁₀)	84,313	1,200	NA	84,313	1,200	NA
Particulate Matter <2.5 Microns (PM _{2.5})	73,016	1,015	NA	73,016	1,015	NA
Sulfur Dioxide (SO ₂)	24,178	22,719	NA	24,178	22,719	NA
Nitrogen Oxides (NO _x)	3,721	3,721	NA	3,721	3,721	NA
Carbon Monoxide (CO)	4,077	4,077	NA	4,077	4,077	NA
Volatile Organic Compounds (VOC)	10,105	1,895	NA	10,105	1,895	NA
Lead (Pb)	0.72	0.72	NA	0.72	0.72	NA
Greenhouse Gases (Mass Basis)	5,518,784	5,518,784	NA	5,518,784	5,518,784	NA
Greenhouse Gases (CO ₂ e Basis)	4,337,209	4,337,209	NA	4,337,209	4,337,209	NA
Highest HAP Prior to Construction (CAS #: 67561)	6,382	867	NA	6,382	867	NA
Highest HAP After Construction (CAS #: 67651)	6,382	867	NA	6,382	867	NA
Total HAP Emissions*	6,839	1,159	NA	6,839	1,159	NA

(*All HAP emitted from the various equipment or processes must be listed in the appropriate "Table D. Potential Emission Rates at Maximum Design Capacity.")



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D. POTENTIAL EMISSION RATES AT MAXIMUM DESIGN CAPACITY									
1. Equipment ID / Process ID	2. Emission Point ID	3. Pollutants (Include CAS #.)	4. Calculation Methods / Limits Taken / Other Comments	5. Uncontrolled		6. Controlled		7. Limited	
				lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
2605 and 3705	2610S1 and 2610S2	PM	See Attachment B	See Attachment B	See Attachment B	See Attachment B	See Attachment B	See Attachment B	See Attachment B
2605 and 3705	2610S1 and 2610S2	PM ₁₀	See Attachment B	See Attachment B	See Attachment B	See Attachment B	See Attachment B	See Attachment B	See Attachment B
2605 and 3705	2610S1 and 2610S2	PM _{2.5}	See Attachment B	See Attachment B	See Attachment B	See Attachment B	See Attachment B	See Attachment B	See Attachment B
2605 and 3705	2610S1 and 2610S2	SO ₂	See Attachment B	See Attachment B	See Attachment B	See Attachment B	See Attachment B	See Attachment B	See Attachment B
2605 and 3705	2610S1 and 2610S2	NO _x	See Attachment B	See Attachment B	See Attachment B	See Attachment B	See Attachment B	See Attachment B	See Attachment B
2605 and 3705	2610S1 and 2610S2	CO	See Attachment B	See Attachment B	See Attachment B	See Attachment B	See Attachment B	See Attachment B	See Attachment B
2605 and 3705	2610S1 and 2610S2	VOC	See Attachment B	See Attachment B	See Attachment B	See Attachment B	See Attachment B	See Attachment B	See Attachment B
2605 and 3705	2610S1 and 2610S2	Lead	See Attachment B	See Attachment B	See Attachment B	See Attachment B	See Attachment B	See Attachment B	See Attachment B
2605 and 3705	2610S1 and 2610S2	GHG	See Attachment B	See Attachment B	See Attachment B	See Attachment B	See Attachment B	See Attachment B	See Attachment B
2605 and 3705	2610S1 and 2610S2	HAPs	See Attachment B	See Attachment B	See Attachment B	See Attachment B	See Attachment B	See Attachment B	See Attachment B



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A. APPLICATION IDENTIFICATION

1. Facility Name: Resolute FP US, Inc.	
2. SC Air Permit Number (8-digits only): 2440 - 0005	3. Application Date: April 14, 2014

B. SOUTH CAROLINA AIR POLLUTION CONTROL REGULATIONS AND STANDARDS

(If not listed below add any additional regulations that are triggered.)

1. Regulation	2. Applicable		Include all limits, work practices, monitoring, record keeping, etc.		
	Yes	No	3. Explain Applicability Determination	4. List the specific limitations and/or requirements that apply.	5. How will compliance be demonstrated?
Regulation 61-62.1, Section II(E) Synthetic Minor Construction Permits	<input type="checkbox"/>	<input checked="" type="checkbox"/>	facility is Title V source		
Regulation 61-62.1, Section II(G) Conditional Major Operating Permits	<input type="checkbox"/>	<input checked="" type="checkbox"/>	facility is Title V source		
Regulation 61-62.5, Standard No. 1 Emissions from Fuel Burning Operations	<input checked="" type="checkbox"/>	<input type="checkbox"/>	applicable to fuel burning operations		
Regulation 61-62.5, Standard No. 2 Ambient Air Quality Standards	<input checked="" type="checkbox"/>	<input type="checkbox"/>	applies to all sources	none	modeling demonstration not required, previously modeled emission rate exceeds projected emissions due to project
Regulation 61-62.5, Standard No. 3 Waste Combustion and Reduction	<input checked="" type="checkbox"/>	<input type="checkbox"/>	specification used oil is combusted	oil sampling/testing per regulation	previous sampling/testing demonstrates compliance
Regulation 61-62.5, Standard No. 3.1 Hospital, Medical, Infections Waste Incinerators (HMIWI)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	no hazardous waste combusted		
Regulation 61-62.5, Standard No. 4 Emissions from Process Industries	<input type="checkbox"/>	<input checked="" type="checkbox"/>	not a process source		
Regulation 61-62.5, Standard No. 5 Volatile Organic Compounds	<input type="checkbox"/>	<input checked="" type="checkbox"/>	not a regulated activity		
Regulation 61-62.5, Standard No. 5.1 BACT/LAER Applicable to VOC	<input type="checkbox"/>	<input checked="" type="checkbox"/>	not a regulated activity		
Regulation 61-62.5, Standard No. 5.2 Control of Oxides of Nitrogen	<input type="checkbox"/>	<input checked="" type="checkbox"/>	project is not a burner modification		
Regulation 61-62.5, Standard No. 7 Prevention of Significant Deterioration	<input type="checkbox"/>	<input checked="" type="checkbox"/>	no emission increase		



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B. SOUTH CAROLINA AIR POLLUTION CONTROL REGULATIONS AND STANDARDS (If not listed below add any additional regulations that are triggered.)					
1. Regulation	2. Applicable		Include all limits, work practices, monitoring, record keeping, etc.		
	Yes	No	3. Explain Applicability Determination	4. List the specific limitations and/or requirements that apply.	5. How will compliance be demonstrated?
Regulation 61-62.5, Standard No. 7.1 Nonattainment New Source Review	<input type="checkbox"/>	<input checked="" type="checkbox"/>	attainment area		
Regulation 61-62.5, Standard No. 8 Toxic Air Pollutants	<input type="checkbox"/>	<input checked="" type="checkbox"/>	does not apply to MACT sources		
Regulation 61-62.6 Control of Fugitive Particulate Matter	<input type="checkbox"/>	<input checked="" type="checkbox"/>	not a regulated activity		
Regulation 61-62.68 Chemical Accident Prevention Provisions	<input type="checkbox"/>	<input checked="" type="checkbox"/>	not a regulated activity		
Regulation 61-62.70 Title V Operating Permit Program	<input checked="" type="checkbox"/>	<input type="checkbox"/>	facility has Title V operating permit		
Regulation 61-62.72 Acid Rain	<input type="checkbox"/>	<input checked="" type="checkbox"/>	not a regulated activity		
Regulation 61-62.96 Nitrogen Oxides Budget Trading Program	<input type="checkbox"/>	<input checked="" type="checkbox"/>	does not apply to No. 1 and No. 2 Combination Boilers		
Regulation 61-62.99 Nitrogen Oxides Budget Program Requirements for Stationary Sources Not In the Trading Program	<input type="checkbox"/>	<input checked="" type="checkbox"/>	not a regulated activity		

C. 40 CFR PART 60 - STANDARDS OF PERFORMANCE FOR NEW STATIONARY SOURCES (If not listed below add any additional regulations that are triggered.)					
1. Subpart and Title	2. Applicable		Include all limits, work practices, monitoring, record keeping, etc.		
	Yes	No	3. Explain Applicability Determination	4. List the specific limitations and/or requirements that apply.	5. How will compliance be demonstrated?
Subpart A - General Provisions	<input type="checkbox"/>	<input checked="" type="checkbox"/>	project exempt from definition of modification		
	<input type="checkbox"/>	<input type="checkbox"/>			
	<input type="checkbox"/>	<input type="checkbox"/>			



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D. 40 CFR PART 61 - NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS

(If not listed below add any additional regulations that are triggered.)

1. Subpart and Title	2. Applicable		Include all limits, work practices, monitoring, record keeping, etc.		
	Yes	No	3. Explain Applicability Determination	4. List the specific limitations and/or requirements that apply.	5. How will compliance be demonstrated?
Subpart A - General Provisions	<input type="checkbox"/>	<input checked="" type="checkbox"/>	not a regulated activity		
	<input type="checkbox"/>	<input type="checkbox"/>			
	<input type="checkbox"/>	<input type="checkbox"/>			

E. 40 CFR PART 63 - NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS FOR SOURCE CATEGORIES

(If not listed below add any additional regulations that are triggered.)

1. Subpart and Title	2. Applicable		Include all limits, work practices, monitoring, record keeping, etc.		
	Yes	No	3. Explain Applicability Determination	4. List the specific limitations and/or requirements that apply.	5. How will compliance be demonstrated?
Subpart A - General Provisions	<input checked="" type="checkbox"/>	<input type="checkbox"/>	future compliance date	future compliance date	future compliance date
Subpart DDDDD - Industrial Boiler MACT	<input checked="" type="checkbox"/>	<input type="checkbox"/>	future compliance date	future compliance date	future compliance date
	<input type="checkbox"/>	<input type="checkbox"/>			

F. OTHER

(If not listed below add any additional regulations, enforcement requirement, permitting requirement, etc. that are triggered.)

1. Regulation and Title / Other	2. Applicable		Include all limits, work practices, monitoring, record keeping, etc.		
	Yes	No	3. Explain Applicability Determination	4. List the specific limitations and/or requirements that apply.	5. How will compliance be demonstrated?
40 CFR Part 64 - Compliance Assurance Monitoring (CAM)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	regulated by MACT		
	<input type="checkbox"/>	<input type="checkbox"/>			
	<input type="checkbox"/>	<input type="checkbox"/>			

ATTACHMENT B
EMISSION CALCULATIONS

No. 1 Combination Boiler Example Calculations

No. 1 Combination Boiler actual heat input = 2,504,956 MMBtu/yr (January 2012 – December 2013)

Particulate Matter

Engineering stack test average emission factor = 0.27 lb/MMBtu

$0.27 \text{ lb/MMBtu} \times 2,504,956 \text{ MMBtu/yr} \times 1 \text{ ton}/2,000 \text{ lb} = 338 \text{ tpy}$

Particulate Matter less than 10 microns (PM₁₀)

AP-42 emission factor ratio = $0.4 \text{ lb PM}_{10}/\text{MMBtu} \div 0.054 \text{ lb PM/MMBtu} = 74\%$

PM₁₀ emission factor = $0.27 \text{ lb PM/MMBtu} \times 0.74 = 0.20 \text{ lb PM}_{10}/\text{MMBtu}$

$0.20 \text{ lb/MMBtu} \times 2,504,956 \text{ MMBtu/yr} \times 1 \text{ ton}/2,000 \text{ lb} = 250 \text{ tpy}$

Particulate Matter less than 2.5 microns (PM_{2.5})

AP-42 emission factor ratio = $0.35 \text{ lb PM}_{2.5}/\text{MMBtu} \div 0.054 \text{ lb PM/MMBtu} = 65\%$

PM_{2.5} emission factor = $0.27 \text{ lb PM/MMBtu} \times 0.65 = 0.18 \text{ lb PM}_{2.5}/\text{MMBtu}$

$0.18 \text{ lb/MMBtu} \times 2,504,956 \text{ MMBtu/yr} \times 1 \text{ ton}/2,000 \text{ lb} = 219 \text{ tpy}$

Condensible Particulate Matter (CPM)

AP-42 emission factor = 0.017 lb CPM/MMBtu

$0.017 \text{ lb/MMBtu} \times 2,504,956 \text{ MMBtu/yr} \times 1 \text{ ton}/2,000 \text{ lb} = 21 \text{ tpy}$

Sulfur Dioxide

Engineering stack test average emission factor = 0.91 lb/MMBtu

$0.91 \text{ lb/MMBtu} \times 2,504,956 \text{ MMBtu/yr} \times 1 \text{ ton}/2,000 \text{ lb} = 1,140 \text{ tpy}$

Nitrogen Dioxide

Engineering stack test average emission factor = 0.31 lb/MMBtu

$0.31 \text{ lb/MMBtu} \times 2,504,956 \text{ MMBtu/yr} \times 1 \text{ ton}/2,000 \text{ lb} = 388 \text{ tpy}$

Carbon Monoxide

Engineering stack test average emission factor = 0.47 lb/MMBtu

$0.47 \text{ lb/MMBtu} \times 2,504,956 \text{ MMBtu/yr} \times 1 \text{ ton}/2,000 \text{ lb} = 589 \text{ tpy}$

Volatile Organic Compounds

AP-42 emission factor = 0.017 lb/MMBtu

$0.017 \text{ lb/MMBtu} \times 2,504,956 \text{ MMBtu/yr} \times 1 \text{ ton}/2,000 \text{ lb} = 21 \text{ tpy}$

Lead

AP-42 emission factor = 4.80E-05 lb/MMBtu

$4.80\text{E-}05 \text{ lb/MMBtu} \times 2,504,956 \text{ MMBtu/yr} \times 1 \text{ ton}/2,000 \text{ lb} = 0.06 \text{ tpy}$

Carbon Dioxide

EPA MRR emission factor = 93.8 kg/MM Btu

$93.8 \text{ kg}/10^6 \text{ Btu} \times 1 \text{ lb}/0.4536 \text{ kg} \times 2,504,956 \text{ MMBtu/yr} \times 1 \text{ ton}/2,000 \text{ lb} = 259,000 \text{ tpy}$

Methane

EPA MRR emission factor = 0.032 kg/MM Btu

$0.032 \text{ kg}/10^6 \text{ Btu} \times 1 \text{ lb}/0.4536 \text{ kg} \times 2,504,956 \text{ MMBtu/yr} \times 1 \text{ ton}/2,000 \text{ lb} = 88 \text{ tpy}$

Nitrous Oxide

EPA MRR emission factor = 0.0042 kg/MM Btu

$0.0042 \text{ kg}/10^6 \text{ Btu} \times 1 \text{ lb}/0.4536 \text{ kg} \times 2,504,956 \text{ MMBtu/yr} \times 1 \text{ ton}/2,000 \text{ lb} = 12 \text{ tpy}$

Table B-1
Emission Calculations and PSD Applicability

Pollutant	No. 1 Combination Boiler							No. 2 Combination Boiler							Total
	Emission Factor		Baseline*	Baseline	Projected	Projected	Emission	Emission Factor		Baseline*	Baseline	Projected	Projected	Emission	Emission
	(lb/MMBtu)	Reference	Heat Input (MMBtu/yr)	Emissions (tpy)	Heat Input (MMBtu/yr)	Emissions (tpy)	Increase (tpy)	(lb/MMBtu)	Reference	Heat Input (MMBtu/yr)	Emissions (tpy)	Heat Input (MMBtu/yr)	Emissions (tpy)	Increase (tpy)	Increase (tpy)
PM	0.27	Test	2,504,956	338	2,504,956	338	0	0.23	Test	3,341,062	384	3,341,062	384	0	0
PM ₁₀	0.20	AP-42**	2,504,956	250	2,504,956	250	0	0.17	AP-42**	3,341,062	285	3,341,062	285	0	0
PM _{2.5}	0.18	AP-42**	2,504,956	219	2,504,956	219	0	0.15	AP-42**	3,341,062	249	3,341,062	249	0	0
CPM	0.017	AP-42**	2,504,956	21	2,504,956	21	0	0.017	AP-42**	3,341,062	28	3,341,062	28	0	0
SO ₂	0.91	Test	2,504,956	1,140	2,504,956	1,140	0	0.77	Test	3,341,062	1,286	3,341,062	1,286	0	0
NO _x	0.31	Test	2,504,956	388	2,504,956	388	0	0.29	Test	3,341,062	484	3,341,062	484	0	0
CO	0.47	Test	2,504,956	589	2,504,956	589	0	0.91	Test	3,341,062	1,520	3,341,062	1,520	0	0
VOC	0.017	AP-42**	2,504,956	21	2,504,956	21	0	0.017	AP-42**	3,341,062	28	3,341,062	28	0	0
Pb	4.80E-05	AP-42**	2,504,956	0.06	2,504,956	0.06	0	4.80E-05	AP-42**	3,341,062	0.08	3,341,062	0.08	0	0
	kg/MMBtu							kg/MMBtu							
CO ₂	93.8	MRR**	2,504,956	259,000	2,504,956	259,000	0	93.8	MRR**	3,341,062	345,449	3,341,062	345,449	0	0
CH ₄	0.032	MRR**	2,504,956	88	2,504,956	88	0	0.032	MRR**	3,341,062	118	3,341,062	118	0	0
N ₂ O	0.0042	MRR**	2,504,956	12	2,504,956	12	0	0.0042	MRR**	3,341,062	15	3,341,062	15	0	0
CO ₂ mass				259,100		259,100	0				345,583		345,583	0	0
CO ₂ equiv.				264,665		264,665	0				353,005		353,005	0	0

* Baseline heat input January 2012 - December 2013.

** Biomass factors (PM₁₀ and PM_{2.5} by ratio of factors)

Table B-2
No. 1 Combination Boiler – Fuel Firing and Heat Input Data

					Conversion Factors				
					Bark	No. 6 Oil	Gas	TDF	
					Btu/lb	btu/gal	btu/cf	btu/lb	
					4,500	150,000	1,020	15,500	
Combination Boiler No. 1					Combination Boiler No. 1				
	Bark	No. 6 Oil	Gas	TDF	Bark	No. 6 Oil	Gas	TDF	TOTAL
Month	(tons)	(gallons)	(MMBtu)	(tons)	(MMBtu)	(MMBtu)	(MMBtu)	(MMBtu)	(MMBtu)
Jan-12	22,045	8,844	4,037	283	198,402	1,327	4,037	8,787	212,553
Feb-12	22,738	3,573	3,412	274	204,645	536	3,412	8,492	217,085
Mar-12	22,350	2,657	4,811	283	201,148	398	4,811	8,779	215,137
Apr-12	24,350	6,089	6,936	400	219,154	913	6,936	12,397	239,400
May-12	20,780	18,815	10,388	334	187,019	2,822	10,388	10,347	210,577
Jun-12	15,307	0	2,988	135	137,765	0	2,988	4,175	144,927
Jul-12	15,230	1,560	9,341	257	137,067	234	9,341	7,956	154,598
Aug-12	22,275	682	6,850	311	200,478	102	6,850	9,649	217,080
Sep-12	22,788	0	4,138	239	205,092	0	4,138	7,407	216,637
Oct-12	21,278	0	7,255	263	191,506	0	7,255	8,139	206,900
Nov-12	25,163	6,940	9,153	321	226,466	1,041	9,153	9,953	246,613
Dec-12	23,348	4,555	6,033	402	210,135	683	6,033	12,461	229,312
Jan-13	24,563	1,350	7,317	447	221,064	203	7,317	13,847	242,430
Feb-13	22,660	1,656	6,177	387	203,939	248	6,177	12,003	222,368
Mar-13	23,326	0	26,980	450	209,934	0	26,980	13,959	250,873
Apr-13	18,522	0	8,044	329	166,702	0	8,044	10,213	184,960
May-13	18,565	0	6,888	395	167,089	0	6,888	12,240	186,217
Jun-13	13,814	0	9,997	308	124,329	0	9,997	9,548	143,874
Jul-13	20,137	0	6,116	134	181,236	0	6,116	4,149	191,501
Aug-13	19,914	0	9,013	392	179,225	0	9,013	12,143	200,381
Sep-13	19,727	2,850	6,479	181	177,539	427	6,479	5,601	190,047
Oct-13	22,000	1,825	16,785	314	197,999	274	16,785	9,743	224,801
Nov-13	21,255	16,587	3,845	255	191,296	2,488	3,845	7,895	205,525
Dec-13	24,384	1,224	26,993	306	219,455	184	26,993	9,485	256,117
24-month Total									5,009,912
Annual Average									2,504,956

Table B-3
No. 2 Combination Boiler – Fuel Firing and Heat Input Data

					Conversion Factors				
					Bark	No. 6 Oil	Gas	TDF	
					Btu/lb	btu/gal	btu/cf	btu/lb	
					4,500	150,000	1,020	15,500	
Month	Combination Boiler No. 1				Combination Boiler No. 1				TOTAL
	Bark (tons)	No. 6 Oil (gallons)	Gas (MMBtu)	TDF (tons)	Bark (MMBtu)	No. 6 Oil (MMBtu)	Gas (MMBtu)	TDF (MMBtu)	
Jan-12	33,852	23,612	9,482	435	304,668	3,542	9,482	13,493	331,185
Feb-12	31,327	7,372	4,349	377	281,943	1,106	4,349	11,699	299,096
Mar-12	28,436	4,456	8,713	360	255,921	668	8,713	11,170	276,472
Apr-12	29,988	8,633	16,269	492	269,892	1,295	16,269	15,267	302,723
May-12	29,433	66,534	19,286	473	264,894	9,980	19,286	14,656	308,816
Jun-12	30,607	266	9,968	269	275,465	40	9,968	8,348	293,821
Jul-12	27,342	0	3,440	461	246,078	0	3,440	14,284	263,802
Aug-12	23,481	0	9,219	328	211,326	0	9,219	10,171	230,716
Sep-12	24,653	0	9,693	259	221,875	0	9,693	8,014	239,582
Oct-12	31,955	0	12,519	394	287,593	0	12,519	12,223	312,335
Nov-12	26,136	64,710	32,566	333	235,226	9,706	32,566	10,338	287,837
Dec-12	30,605	18,704	24,391	527	275,441	2,806	24,391	16,333	318,971
Jan-13	30,716	9,784	34,023	559	276,447	1,468	34,023	17,316	329,254
Feb-13	25,278	15,751	22,240	432	227,501	2,363	22,240	13,390	265,494
Mar-13	29,986	2,368	37,355	579	269,876	355	37,355	17,945	325,532
Apr-13	26,035	1,284	11,650	463	234,318	193	11,650	14,356	260,516
May-13	26,112	0	12,931	555	235,010	0	12,931	17,216	265,157
Jun-13	22,250	667	34,428	496	200,251	100	34,428	15,379	250,157
Jul-13	21,627	0	13,146	144	194,646	0	13,146	4,456	212,248
Aug-13	21,992	0	12,793	433	197,932	0	12,793	13,411	224,135
Sep-13	28,321	0	13,219	259	254,888	0	13,219	8,041	276,148
Oct-13	22,246	6,162	15,606	318	200,211	924	15,606	9,852	226,594
Nov-13	27,059	0	6,667	324	243,532	0	6,667	10,051	260,251
Dec-13	28,973	3,838	48,680	364	260,757	576	48,680	11,271	321,284
24-month Total									6,682,125
Annual Average									3,341,062

Table B-4
No. 1 Combination Boiler – Engineering Stack Test Summary

						Conversion Factors				
						Bark	4,500	Btu/lb		
						Nat. Gas	1,020	Btu/ft ³		
						#6 Oil	150,000	Btu/gal		
Test Parameter	Units	AVG	Test 1: Grate only	Test 2: Grate only	Test 3: Grate w/o NCGs	Test 4: Grate w/o NCGs	Test 5: Grate + Oil	Test 6: Grate + Oil	Test 7: Grate + NG	Test 8: Grate + NG
Bark Flow	10 ³ lb/hr	77.77	83.67	75.19	72.61	75.01	92.22	91.26	66.56	65.64
Natural Gas Flow	10 ³ ft ³ /hr	30.03							29.38	30.67
Fuel Oil Flow	gal/min	10.97					11.61	10.33		
Heat Input	MMBtu/hr	382.3	376.5	338.4	326.7	337.5	519.5	503.6	329.5	326.7
Steam Leaving SH	10 ³ lb/hr	240.04	232.55	206.21	202.40	206.60	272.46	261.29	270.99	267.83
Stack Gas Flow	dscfm	130,082	118,290	123,885	106,688	109,632	140,312	139,007	153,606	149,237
O ₂ Leaving Stack	% vol, dry	10.1	9.4	10.4	9.4	9.5	9.6	10.3	10.8	11.2
Stack Temperature	deg F	387	381	382	358	357	392	396	414	412
Particulate at Stack	gr/ft ³	0.085	0.040	0.033	0.016	0.012	0.124	0.156	0.222	0.079
Particulate at Stack	lb/hr	104	40	35	15	11	149	186	292	101
Particulate at Stack	lb/MMBtu	0.27	0.11	0.10	0.05	0.03	0.29	0.37	0.89	0.31
Nitrogen Oxides at Stack	ppm	126	139	138	114	111	123	142	124	114
Nitrogen Oxides at Stack	lb/hr	117	118	122	87	87	124	141	136	122
Nitrogen Oxides at Stack	lb/MMBtu	0.31	0.31	0.36	0.27	0.26	0.24	0.28	0.41	0.37
Sulfur Dioxide at Stack	ppm	264	371	389	13	18	419	395	255	253
Sulfur Dioxide at Stack	lb/hr	357	438	481	14	20	586	548	391	377
Sulfur Dioxide at Stack	lb/MMBtu	0.91	1.16	1.42	0.04	0.06	1.13	1.09	1.19	1.15
Carbon Monoxide at Stack	ppm	323	189	148	555	838	262	268	194	131
Carbon Monoxide at Stack	lb/hr	172	98	80	258	400	160	162	130	85
Carbon Monoxide at Stack	ppm @ 3%	522	294	252	864	1,316	415	453	344	242
Carbon Monoxide at Stack	lb/MMBtu	0.47	0.26	0.24	0.79	1.19	0.31	0.32	0.39	0.26

Table B-5
No. 2 Combination Boiler – Engineering Stack Test Summary

Summary of Boiler MACT Engineering Stack Test Data								
No. 2 Combination Boiler								
					Conversion Factors			
					Bark	4,500	Btu/lb	
					Nat. Gas	1,020	Btu/ft ³	
					#6 Oil	150,000	Btu/gal	
Test Parameter	Units	AVG	Test 1: Grate only	Test 2: Grate only	Test 3: Grate + NG	Test 4: Grate + NG	Test 5: Grate + Oil	Test 6: Grate + Oil
Bark Flow	10 ³ lb/hr	100.57	99.4	94.2	96.1	88.5	113.8	111.4
Natural Gas Flow	10 ³ ft ³ /hr	219.20			221	217.4		
Fuel Oil Flow	gal/min	15.90					15.6	16.2
Heat Input	MMBtu/hr	546.1	447.3	423.9	657.9	448.2	652.5	647.1
Steam Leaving SH	10 ³ lb/hr	298.50	217.1	208.9	351	321.7	347	345.3
Stack Gas Flow	dscfm	203,000	208,000	207,000	188,000	187,000	220,000	208,000
O ₂ Leaving Stack	% vol, dry	12.6	14.6	14.6	11.1	11.9	12.0	11.6
Stack Temperature	deg F	406	381	388.2	420.6	415.3	410.5	419.9
Particulate at Stack	gr/ft ³	130	125	45	115	116	136	244
Particulate at Stack	lb/hr	0.075	0.0699	0.0255	0.0712	0.0725	0.072	0.1367
Particulate at Stack	lb/MMBtu	0.23	0.28	0.11	0.17	0.26	0.21	0.38
Nitrogen Oxides at Stack	ppm	104	108	94	85	97	124	116
Nitrogen Oxides at Stack	lb/hr	152	161	139	114	130	195	173
Nitrogen Oxides at Stack	lb/MMBtu	0.29	0.36	0.33	0.17	0.29	0.30	0.27
Sulfur Dioxide at Stack	ppm	211	128	148	163	147	331	347
Sulfur Dioxide at Stack	lb/hr	433	266	305	305	274	726	720
Sulfur Dioxide at Stack	lb/MMBtu	0.77	0.59	0.72	0.46	0.61	1.11	1.11
Carbon Monoxide at Stack	ppm	544	557	573	1159	701	123	149
Carbon Monoxide at Stack	lb/hr	466	506	516	948	571	118	135
Carbon Monoxide at Stack	ppm @ 3%	1,209	1,583	1,628	2,117	1,394	247	287
Carbon Monoxide at Stack	lb/MMBtu	0.91	1.13	1.22	1.44	1.27	0.18	0.21

Table B-6
No. 1 Combination Boiler – Biomass Emission Calculations

1. & 2. PROCESS EMISSION SOURCE	MAXIMUM PRODUCTION	PRODUCTION UNITS	ACTUAL PRODUCTION	PRODUCTION UNITS	MAXIMUM HOURS PER DAY	MAXIMUM DAYS PER WEEK	MAXIMUM DAYS PER YEAR	ACTUAL DAYS PER YEAR			
Combination Boiler 1 - Wood Waste	392	MM Btu/hr	254	MM Btu/hr	24	7	365	362			
AEI Group ID = 008, Process Unit ID = 5											
Title V Unit ID = 08, Equipment ID = 2605											
3. POLLUTANT	4. CAS #	5. TYPE	8. EMISSION FACTOR INFORMATION			PROCESS VARIABILITY FACTOR	CONTROL EFFICIENCY	6. MAXIMUM UNCONTROLLED EMISSIONS		7. MAXIMUM CONTROLLED EMISSIONS	
			VALUE	UNITS	BASIS			(lb/hr)	(tons/yr)	(lb/hr)	(tons/yr)
Filterable particulate matter			2.70E-01	#/MM Btu	O	1	99%	10,584.00	46,357.92	105.84	463.58
Filterable particulate matter < 10 microns		Criteria	2.00E-01	#/MM Btu	P	1	99%	7,840.00	34,339.20	78.40	343.39
Filterable particulate matter < 2.5 microns		Criteria	1.80E-01	#/MM Btu	P	1	99%	7,056.00	30,905.28	70.56	309.05
Condensable particulate matter < 2.5 microns		Criteria	1.70E-02	#/MM Btu	A	1		6.66	29.19	6.66	29.19
Total particulate matter						1		10,590.66	46,387.11	112.50	492.77
Total particulate matter < 10 microns		Criteria				1		7,846.66	34,368.39	85.06	372.58
Total particulate matter < 2.5 microns		Criteria				1		7,062.66	30,934.47	77.22	338.24
Sulfur dioxide	7446095	Criteria	2.50E-02	#/MM Btu	B	1		9.80	42.92	9.80	42.92
Volatile organic compounds (as carbon)		Criteria	1.30E-02	#/MM Btu	F	1		5.10	22.32	5.10	22.32
Volatile organic compounds (as VOC)		Criteria	1.30E-02	#/MM Btu	K	2.5		12.74	55.80	12.74	55.80
Volatile organic compounds (sum of VOC)		Criteria			N	1		4.38	19.20	4.38	19.20
Carbon monoxide		Criteria	4.70E-01	#/MM Btu	O	1		184.24	806.97	184.24	806.97
Lead		Criteria	7.40E-06	#/MM Btu	G	1		0.00	0.01	0.00	0.01
Nitrogen oxides		Criteria	3.10E-01	#/MM Btu	O	1		121.52	532.26	121.52	532.26
Carbon dioxide	124389	GHG				1		0.00			
Biogenic carbon dioxide	124389	GHG	9.38E+01	kg/MM Btu	L	1		81,061.73	355,050.37	81,061.73	355,050.37
Methane	74828	GHG, (112r)	3.20E-02	kg/MM Btu	L	1		27.65	121.13	27.65	121.13
Nitrous oxide	10024972	GHG	4.20E-03	kg/MM Btu	L	1		3.63	15.90	3.63	15.90
Carbon dioxide equivalent		GHG			M	1		82,767.65	362,522.33	82,767.65	362,522.33
Chlorine dioxide	10049044	112r				1					
Sulfuric acid mist	7664939	TAP				1					
Hydrogen Sulfide	7783064	NSPS, TAP	0.0E+00			1					
Total Reduced Sulfur (as TRS)		NSPS	0.0E+00	#/MM Btu	E	1		0.00	0.00	0.00	0.00
Total Reduced Sulfur (as Sulfur)		NSPS	0.0E+00	#/MM Btu	E	1		0.00	0.00	0.00	0.00
Total Reduced Sulfur (as Hydrogen Sulfide)		NSPS	0.0E+00	#/MM Btu	E	1		0.00	0.00	0.00	0.00
Total 112(b) Hazardous Air Pollutants								1.61	7.05	1.61	7.05
8. REFERENCES:											
A) Emission factors from AP-42 - Table 1.6-1, Bark/Wood-fired Boiler with ESP.											
B) Emission factors from AP-42 Table 1.6-2.											
C) Emission factors from AP-42 Table 1.6-3.											
D) Emission factors from AP-42 Table 1.6-4.											
E) Median emission factors from NCASI Technical Bulletin No. 701 - Table 19A, Wood-fired Boilers.											
F) Emission factors from NCASI Technical Bulletin 858, Table 20A.											
G) Emission factors from NCASI Technical Bulletin 858, Table 20B - Fabric Filter/ESP (except Ag, P, and Th wet scrubber - no ESP factor).											
H) Average emission factors from NCASI Technical Bulletin No. 646 - Table 1, Bark/Wood Residue Boilers. Emission factor converted from #/TWWF to #/MM Btu assuming 9 MM Btu/TWWF.											
I) Average emission factors from NCASI Technical Bulletin No. 646 - Table 2, Bark/Wood Residue Boilers. Emission factor converted from #/TDF to #/MM Btu assuming 18 MM Btu/TDF.											
J) Average emission factors from NCASI Technical Bulletin No. 646 - Table 3, Bark/Wood Residue Boilers.											
K) Primary VOC assumed to be formaldehyde.											
L) Emission factor for wood and wood residuals combustion in EPA MRR, Table C-1 and C-2.											
M) Emission factor based on GWP in EPA MRR, Table A-1.											
N) VOC emissions are sum of individual speciated VOC.											
O) Average emission factor from October 2013 Boiler MACT testing.											
P) PM emission factor multiplied by AP-42 ratio of PM/PM10 and PM/PM2.5.											
9. NOTES:											
Actual production is calendar year 2011 production rate.											
Actual production is calendar year 2005 production rate.											
Maximum production is permitted production rate.											
Total reduced sulfur emission are the sum of emissions of hydrogen sulfide, methyl mercaptan, dimethyl sulfide, and dimethyl disulfide.											
Process variability factors for metal compounds assume conversion of elemental metal to lowest state metal oxide, except HF.											

Table B-7
No. 1 Combination Boiler – Natural Gas Emission Calculations

1. & 2. PROCESS EMISSION SOURCE	MAXIMUM PRODUCTION	PRODUCTION UNITS	ACTUAL PRODUCTION	PRODUCTION UNITS	MAXIMUM HOURS PER DAY	MAXIMUM DAYS PER WEEK	MAXIMUM DAYS PER YEAR	ACTUAL DAYS PER YEAR				
Combination Boiler 1 - Natural Gas	405	MM Btu/hr	6	MM Btu/hr	24	7	365	364				
AEI Group ID = 008, Process Unit ID = 4												
Title V Unit ID = 08, Equipment ID = 2605												
3. POLLUTANT	4. CAS #	5. TYPE	8. EMISSION FACTOR INFORMATION			PROCESS VARIABILITY FACTOR	CONTROL EFFICIENCY	6. MAXIMUM UNCONTROLLED EMISSIONS		7. MAXIMUM CONTROLLED EMISSIONS		
			VALUE	UNITS	BASIS			(lb/hr)	(tons/yr)	(lb/hr)	(tons/yr)	
Filterable particulate matter			1.90E-03	#/MM Btu	B	1		0.77	3.37	0.77	3.37	
Filterable particulate matter < 10 microns		Criteria	1.90E-03	#/MM Btu	E	1		0.77	3.37	0.77	3.37	
Filterable particulate matter < 2.5 microns		Criteria	1.90E-03	#/MM Btu	E	1		0.77	3.37	0.77	3.37	
Condensible particulate matter < 2.5 microns		Criteria	5.70E-03	#/MM Btu	B	1		2.31	10.11	2.31	10.11	
Total particulate matter						1		3.08	13.48	3.08	13.48	
Total particulate matter < 10 microns		Criteria				1		3.08	13.48	3.08	13.48	
Total particulate matter < 2.5 microns		Criteria				1		3.08	13.48	3.08	13.48	
Sulfur dioxide	7446095	Criteria	6.00E-04	#/MM Btu	B	1		0.24	1.06	0.24	1.06	
Volatile organic compounds (as carbon)		Criteria	5.50E-03	#/MM Btu	B	1		2.23	9.76	2.23	9.76	
Volatile organic compounds (as VOC)		Criteria	5.50E-03	#/MM Btu	F	2.5		5.57	24.39	5.57	24.39	
Volatile organic compounds (sum of VOC)		Criteria			G	1		4.67	20.47	4.67	20.47	
Carbon monoxide		Criteria	8.40E-02	#/MM Btu	A	1		34.02	149.01	34.02	149.01	
Lead		Criteria	5.00E-07	#/MM Btu	B	1		0.00	0.00	0.00	0.00	
Nitrogen oxides		Criteria	2.80E-01	#/MM Btu	A	1		113.40	496.69	113.40	496.69	
Carbon dioxide	124389	GHG	5.30E+01	kg/MM Btu	I	1		47,339.29	207,346.07	47,339.29	207,346.07	
Biogenic carbon dioxide	124389	GHG				1		0.00				
Methane	74828	GHG, (112r)	1.00E-03	kg/MM Btu	I	1		0.89	3.91	0.89	3.91	
Nitrous oxide	10024972	GHG	1.00E-04	kg/MM Btu	I	1		0.09	0.39	0.09	0.39	
Carbon dioxide equivalent		GHG			J	1		47,385.71	207,549.43	47,385.71	207,549.43	
Chlorine dioxide	10049044	112r				1						
Sulfuric acid mist	7664939	TAP				1						
Hydrogen Sulfide	7783064	NSPS, TAP				1						
Total Reduced Sulfur (as TRS)		NSPS				1						
Total Reduced Sulfur (as Sulfur)		NSPS				1						
Total Reduced Sulfur (as Hydrogen Sulfide)		NSPS				1						
Total 112(b) Hazardous Air Pollutants								0.87	3.81	0.87	3.81	
8. REFERENCES:												
A) Emission factors from AP-42 for Uncontrolled Utility/Large Industrial Natural Gas-fired Boilers - Table 1.4-1.												
B) Emission factors from AP-42 for Uncontrolled Utility/Large Industrial Natural Gas-fired Boilers - Table 1.4-2.												
C) Emission factors from AP-42 for Uncontrolled Utility/Large Industrial Natural Gas-fired Boilers - Table 1.4-3.												
D) Highest emission factors from NCASI Technical Bulletin No. 650 (Table 4c), Natural Gas-fired Utility Boilers.												
E) All particulate matter assumed to be less than 2.5, per AP-42.												
F) Primary VOC assumed to be formaldehyde.												
G) VOC emissions are sum of individual speciated VOC.												
H) Emission factors from AP-42 for Uncontrolled Natural Gas-fired Boilers - Table 1.4-4.												
I) Emission factor for natural gas combustion in EPA MRR, Table C-1 and C-2.												
J) Emission factor based on GWP in EPA MRR, Table A-1.												
9. NOTES:												
Actual production is calendar year 2011 production rate.												
Actual production is calendar year 2005 production rate.												
Maximum production is permitted production rate.												
Total reduced sulfur emission are the sum of emissions of hydrogen sulfide, methyl mercaptan, dimethyl sulfide, and dimethyl disulfide.												
Process variability factors for metal compounds assume conversion of elemental metal to lowest state metal oxide, except HF.												

Table B-8
No. 1 Combination Boiler – No. 6 Fuel Oil Emission Calculations

1. & 2. PROCESS EMISSION SOURCE	MAXIMUM PRODUCTION	PRODUCTION UNITS	ACTUAL PRODUCTION	PRODUCTION UNITS	MAXIMUM HOURS PER DAY	MAXIMUM DAYS PER WEEK	MAXIMUM DAYS PER YEAR	ACTUAL DAYS PER YEAR				
Combination Boiler 1 - No. 6 Fuel Oil	392	MM Btu/hr	6	MM Btu/hr	24	7	365	364				
AEI Group ID = 008, Process Unit ID = 3												
Title V Unit ID = 08, Equipment ID = 2605												
			8. EMISSION FACTOR INFORMATION			PROCESS VARIABILITY	CONTROL EFFICIENCY	6. MAXIMUM UNCONTROLLED EMISSIONS		7. MAXIMUM CONTROLLED EMISSIONS		
3. POLLUTANT	4. CAS #	5. TYPE	VALUE	UNITS	BASIS	FACTOR		(lb/hr)	(tons/yr)	(lb/hr)	(tons/yr)	
Filterable particulate matter			1.51E-01	#/MM Btu	K	1		59.04	258.60	59.04	258.60	
Filterable particulate matter < 10 microns		Criteria	1.07E-01	#/MM Btu	K	1		41.97	183.83	41.97	183.83	
Filterable particulate matter < 2.5 microns		Criteria	7.80E-02	#/MM Btu	K	1		30.59	133.98	30.59	133.98	
Condensible particulate matter < 2.5 microns		Criteria	1.00E-02	#/MM Btu	C	1		3.92	17.17	3.92	17.17	
Total paticulate matter								62.96	275.77	62.96	275.77	
Total particulate matter < 10 microns		Criteria						45.89	201.00	45.89	201.00	
Total particulate matter < 2.5 microns		Criteria						34.51	151.15	34.51	151.15	
Sulfur dioxide	7446095	Criteria	2.20E+00	#/MM Btu	A	1		861.62	3,773.88	861.62	3,773.88	
Volatile organic compounds (as carbon)		Criteria	5.07E-03	#/MM Btu	B	1		1.99	8.70	1.99	8.70	
Volatile organic compounds (as VOC)		Criteria	5.07E-03	#/MM Btu	M	2.5		4.97	21.75	4.97	21.75	
Volatile organic compounds (sum of VOC)		Criteria			N	1		0.23	1.02	0.23	1.02	
Carbon monoxide		Criteria	3.33E-02	#/MM Btu	A	1		13.07	57.23	13.07	57.23	
Lead		Criteria	2.80E-05	#/MM Btu	G	1		0.01	0.05	0.01	0.05	
Nitrogen oxides		Criteria	3.13E-01	#/MM Btu	A	1		122.83	537.98	122.83	537.98	
Carbon dioxide	124389	GHG	7.51E+01	kg/MM Btu	I	1		64,901.23	284,267.41	64,901.23	284,267.41	
Biogenic carbon dioxide	124389	GHG				1		0.00				
Methane	74828	GHG, (112r)	3.00E-03	kg/MM Btu	I	1		2.59	11.36	2.59	11.36	
Nitrous oxide	10024972	GHG	6.00E-04	kg/MM Btu	I	1		0.52	2.27	0.52	2.27	
Carbon dioxide equivalent		GHG			J			65,116.42	285,209.92	65,116.42	285,209.92	
Chlorine dioxide	10049044	112r				1						
Sulfuric acid mist	7664939	TAP	7.98E-02	#/MM Btu	L	1.23		38.32	167.84	38.32	167.84	
Hydrogen Sulfide	7783064	NSPS, TAP				1						
Total Reduced Sulfur (as TRS)		NSPS				1						
Total Reduced Sulfur (as Sulfur)		NSPS				1						
Total Reduced Sulfur (as Hydrogen Sulfide)		NSPS				1						
Total 112(b) Hazardous Air Pollutants								1.87	8.20	1.87	8.20	
8. REFERENCES:												
A) Maximum emission factors from AP-42 for Uncontrolled Residual Oil-fired Utility Boilers Table 1.3-1: assumes 2.1% S.												
B) Maximum emission factors from AP-42 for Uncontrolled Residual Oil-fired Utility Boilers - Table 1.3-3.												
C) Maximum emission factors from AP-42 for Residual Oil-fired Utility Boilers with ESPs Table 1.3-4: assumes 2.1% Sulfur.												
D) Maximum emission factors from AP-42 for Uncontrolled Residual Oil-fired Utility Boilers - Table 1.3-8.												
E) Maximum emission factors from AP-42 for Uncontrolled Residual Oil-fired Utility Boilers - Table 1.3-9 (PCDD is OCDD).												
F) Maximum emission factors from AP-42 for Uncontrolled Residual Oil-fired Utility Boilers - Table 1.3-11.												
G) Emission factor from U.S. EPA document "Estimating Air Toxic Emissions from Coal and Oil Combustion Sources" [EPA-450/2-89-001] for Uncontrolled Residual Oil-fired Utility Boilers (Table 4-1).												
H) Highest emission factors from NCASI Technical Bulletin No. 650 (Table 4b), Residual Oil-fired Utility Boilers.												
I) Emission factor for kerosene combustion in EPA MRR, Table C-1 and C-2.												
J) Emission factor based on GWP in EPA MRR, Table A-1.												
K) PM-10 and PM-2.5 ratio based on AP-42, Table 1.3-4.												
L) Maximum SO3 emission factor from AP-42 for Uncontrolled Residual Oil-fired Utility Boilers Table 1.3-1: assumes 2.1% S. Process variability factor adjusts SO3 to H2SO4.												
M) Primary VOC assumed to be formaldehyde.												
N) VOC emissions are sum of individual speciated VOC.												
</												

Table B-9
No. 1 Combination Boiler – Tire Derived Fuel (TDF) Emission Calculations

1. & 2. PROCESS EMISSION SOURCE	MAXIMUM PRODUCTION	PRODUCTION UNITS	ACTUAL PRODUCTION	PRODUCTION UNITS	MAXIMUM HOURS PER DAY	MAXIMUM DAYS PER WEEK	MAXIMUM DAYS PER YEAR	ACTUAL DAYS PER YEAR			
Combination Boiler 1 - Tire Derived Fuel (TDF)	1.50	Ton TDF/hr	0.45	Ton TDF/hr	24	7	365	362			
AEI Group ID = 008, Process Unit ID = 6											
Title V Unit ID = 08, Equipment ID = 2605											
3. POLLUTANT	4. CAS #	5. TYPE	8. EMISSION FACTOR INFORMATION			PROCESS VARIABILITY FACTOR	CONTROL EFFICIENCY	6. MAXIMUM UNCONTROLLED EMISSIONS		7. MAXIMUM CONTROLLED EMISSIONS	
			VALUE	UNITS	BASIS			(lb/hr)	(tons/yr)	(lb/hr)	(tons/yr)
Filterable particulate matter			2.20E-06	#/MM Btu	D	1	99%	0.01	0.04	0.00	0.00
Filterable particulate matter < 10 microns		Criteria	2.20E-06	#/MM Btu	G	1	99%	0.01	0.04	0.00	0.00
Filterable particulate matter < 2.5 microns		Criteria	2.20E-06	#/MM Btu	G	1	99%	0.01	0.04	0.00	0.00
Condensable particulate matter < 2.5 microns		Criteria				1					
Total particulate matter								0.01	0.04	0.00	0.00
Total particulate matter < 10 microns		Criteria						0.01	0.04	0.00	0.00
Total particulate matter < 2.5 microns		Criteria						0.01	0.04	0.00	0.00
Sulfur dioxide	7446095	Criteria	1.40E-05	#/MM Btu	D	1		0.00	0.00	0.00	0.00
Volatile organic compounds (as carbon)		Criteria				1					
Volatile organic compounds (as VOC)		Criteria				1					
Volatile organic compounds (sum of VOC)		Criteria				1		0.01	0.04	0.01	0.04
Carbon monoxide		Criteria	7.20E-05	#/MM Btu	D	1		0.00	0.01	0.00	0.01
Lead		Criteria	3.44E-02	#/Ton TDF	A	1		0.05	0.23	0.05	0.23
Nitrogen oxides		Criteria	9.80E-05	#/MM Btu	D	1		0.00	0.02	0.00	0.02
Carbon dioxide	124389	GHG	8.60E+01	kg/MM Btu	E	1		284.29	1,245.20	284.29	1,245.20
Biogenic carbon dioxide	124389	GHG				1		0.00			
Methane	74828	GHG, (112r)	3.20E-02	kg/MM Btu	E	1		0.11	0.46	0.11	0.46
Nitrous oxide	10024972	GHG	4.20E-03	kg/MM Btu	E	1		0.01	0.06	0.01	0.06
Carbon dioxide equivalent		GHG			F			290.82	1,273.79	290.82	1,273.79
Chlorine dioxide	10049044	112r				1					
Sulfuric acid mist	7664939	TAP				1					
Hydrogen Sulfide	7783064	NSPS, TAP				1					
Total Reduced Sulfur (as TRS)		NSPS				1					
Total Reduced Sulfur (as Sulfur)		NSPS				1					
Total Reduced Sulfur (as Hydrogen Sulfide)		NSPS				1					
Total 112(b) Hazardous Air Pollutants								7.62	33.39	7.62	33.39
8. REFERENCES:											
A) Emission factor developed from Bowerstack test (3/1/2001).											
B) Emission factor from "Air Emissions from Scrap Tire Combustion" (EPA-600/R-97-115), Table 18 - Greater of 7%, 15%, 17%, or 19% TDF.											
C) Emission factor from "Air Emissions from Scrap Tire Combustion" (EPA-600/R-97-115), Table 19 - 100% TDF.											
D) Emission factor from "Air Emissions from Scrap Tire Combustion" (EPA-600/R-97-115), Table 21 - 100% TDF.											
E) Emission factor for tires combustion in EPA MRR, Table C-1 and C-2.											
F) Emission factor based on GWP in EPA MRR, Table A-1.											
G) PM-10 and PM-2.5 emissions assumed equivalent to TPM.											
9. NOTES:											
Actual production is calendar year 2011 production rate.											
Maximum production is maximum expected production rate.											
Total reduced sulfur emission are the sum of emissions of hydrogen sulfide, methyl mercaptan, dimethyl sulfide, and dimethyl disulfide.											
Process variability factors for metal compounds assume conversion of elemental metal to lowest state metal oxide, except HF.											

Table B-10
No. 2 Combination Boiler – Biomass Emission Calculations

1. & 2. PROCESS EMISSION SOURCE	MAXIMUM PRODUCTION	PRODUCTION UNITS	ACTUAL PRODUCTION	PRODUCTION UNITS	MAXIMUM HOURS PER DAY	MAXIMUM DAYS PER WEEK	MAXIMUM DAYS PER YEAR	ACTUAL DAYS PER YEAR				
Combination Boiler 2 - Wood Waste	498	MM Btu/hr	359	MM Btu/hr	24	7	365	356				
AEI Group ID = 008, Process Unit ID = 10												
Title V Unit ID = 08, Equipment ID = 3705												
3. POLLUTANT	4. CAS #	5. TYPE	8. EMISSION FACTOR INFORMATION			PROCESS VARIABILITY FACTOR	CONTROL EFFICIENCY	6. MAXIMUM UNCONTROLLED EMISSIONS		7. MAXIMUM CONTROLLED EMISSIONS		
			VALUE	UNITS	BASIS			(lb/hr)	(tons/yr)	(lb/hr)	(tons/yr)	
Filterable particulate matter			2.30E-01	#/MM Btu	O	1	99%	11,454.00	50,168.52	114.54	501.69	
Filterable particulate matter < 10 microns		Criteria	1.70E-01	#/MM Btu	P	1	99%	8,466.00	37,081.08	84.66	370.81	
Filterable particulate matter < 2.5 microns		Criteria	1.50E-01	#/MM Btu	P	1	99%	7,470.00	32,718.60	74.70	327.19	
Condensable particulate matter < 2.5 microns		Criteria	1.70E-02	#/MM Btu	A	1		8.47	37.08	8.47	37.08	
Total particulate matter						1		11,462.47	50,205.60	123.01	538.77	
Total particulate matter < 10 microns		Criteria				1		8,474.47	37,118.16	93.13	407.89	
Total particulate matter < 2.5 microns		Criteria				1		7,478.47	32,755.68	83.17	364.27	
Sulfur dioxide	7446095	Criteria	2.50E-02	#/MM Btu	B	1		12.45	54.53	12.45	54.53	
Volatile organic compounds (as carbon)		Criteria	1.30E-02	#/MM Btu	F	1		6.47	28.36	6.47	28.36	
Volatile organic compounds (as VOC)		Criteria	1.30E-02	#/MM Btu	K	2.5		16.19	70.89	16.19	70.89	
Volatile organic compounds (sum of VOC)		Criteria			N	1		5.57	24.39	5.57	24.39	
Carbon monoxide		Criteria	9.10E-01	#/MM Btu	O	1		453.18	1,984.93	453.18	1,984.93	
Lead		Criteria	7.40E-06	#/MM Btu	G	1		0.00	0.02	0.00	0.02	
Nitrogen oxides		Criteria	2.90E-01	#/MM Btu	O	1		144.42	632.56	144.42	632.56	
Carbon dioxide	124389	GHG				1		0.00				
Biogenic carbon dioxide	124389	GHG	9.38E+01	kg/MM Btu	L	1		102,981.48	451,058.89	102,981.48	451,058.89	
Methane	74828	GHG, (112r)	3.20E-02	kg/MM Btu	L	1		35.13	153.88	35.13	153.88	
Nitrous oxide	10024972	GHG	4.20E-03	kg/MM Btu	L	1		4.61	20.20	4.61	20.20	
Carbon dioxide equivalent		GHG			M	1		105,148.70	460,551.32	105,148.70	460,551.32	
Chlorine dioxide	10049044	112r				1						
Sulfuric acid mist	7664939	TAP				1						
Hydrogen Sulfide	7783064	NSPS, TAP	0.0E+00			1						
Total Reduced Sulfur (as TRS)		NSPS	0.0E+00	#/MM Btu	E	1		0.00	0.00	0.00	0.00	
Total Reduced Sulfur (as Sulfur)		NSPS	0.0E+00	#/MM Btu	E	1		0.00	0.00	0.00	0.00	
Total Reduced Sulfur (as Hydrogen Sulfide)		NSPS	0.0E+00	#/MM Btu	E	1		0.00	0.00	0.00	0.00	
Total 112(b) Hazardous Air Pollutants								2.04	8.95	2.04	8.95	
8. REFERENCES:												
A) Emission factors from AP-42 - Table 1.6-1, Bark/Wood-fired Boiler with ESP.												
B) Emission factors from AP-42 Table 1.6-2.												
C) Emission factors from AP-42 Table 1.6-3.												
D) Emission factors from AP-42 Table 1.6-4.												
E) Median emission factors from NCASI Technical Bulletin No. 701 - Table 19A, Wood-fired Boilers.												
F) Emission factors from NCASI Technical Bulletin 858, Table 20A.												
G) Emission factors from NCASI Technical Bulletin 858, Table 20B - Fabric Filter/ESP (except Ag, P, and Th wet scrubber - no ESP factor).												
H) Average emission factors from NCASI Technical Bulletin No. 646 - Table 1, Bark/Wood Residue Boilers. Emission factor converted from #/TWWF to #/MM Btu assuming 9 MM Btu/TWWF.												
I) Average emission factors from NCASI Technical Bulletin No. 646 - Table 2, Bark/Wood Residue Boilers. Emission factor converted from #/TDF to #/MM Btu assuming 18 MM Btu/TDF.												
J) Average emission factors from NCASI Technical Bulletin No. 646 - Table 3, Bark/Wood Residue Boilers.												
K) Primary VOC assumed to be formaldehyde.												
L) Emission factor for wood and wood residuals combustion in EPA MRR, Table C-1 and C-2.												
M) Emission factor based on GWP in EPA MRR, Table A-1.												
N) VOC emissions are sum of individual speciated VOC.												
O) Average emission factor from October 2013 Boiler MACT testing.												
P) PM emission factor multiplied by AP-42 ratio of PM/PM10 and PM/PM2.5.												
9. NOTES:												
Actual production is calendar year 2011 production rate.												
Actual production is calendar year 2005 production rate.												
Maximum production is permitted production rate.												
Total reduced sulfur emission are the sum of emissions of hydrogen sulfide, methyl mercaptan, dimethyl sulfide, and dimethyl disulfide.												
Process variability factors for metal compounds assume conversion of elemental metal to lowest state metal oxide, except HF.												

Table B-11
No. 2 Combination Boiler – Natural Gas Emission Calculations

1. & 2. PROCESS EMISSION SOURCE	MAXIMUM PRODUCTION	PRODUCTION UNITS	ACTUAL PRODUCTION	PRODUCTION UNITS	MAXIMUM HOURS PER DAY	MAXIMUM DAYS PER WEEK	MAXIMUM DAYS PER YEAR	ACTUAL DAYS PER YEAR				
Combination Boiler 2 - Natural Gas	720	MM Btu/hr	7	MM Btu/hr	24	7	365	358				
AEI Group ID = 008, Process Unit ID = 9												
Title V Unit ID = 08, Equipment ID = 3705												
3. POLLUTANT	4. CAS #	5. TYPE	8. EMISSION FACTOR INFORMATION			PROCESS VARIABILITY FACTOR	CONTROL EFFICIENCY	6. MAXIMUM UNCONTROLLED EMISSIONS		7. MAXIMUM CONTROLLED EMISSIONS		
			VALUE	UNITS	BASIS			(lb/hr)	(tons/yr)	(lb/hr)	(tons/yr)	
Filterable particulate matter			1.90E-03	#/MM Btu	B	1		1.37	5.99	1.37	5.99	
Filterable particulate matter < 10 microns		Criteria	1.90E-03	#/MM Btu	E	1		1.37	5.99	1.37	5.99	
Filterable particulate matter < 2.5 microns		Criteria	1.90E-03	#/MM Btu	E	1		1.37	5.99	1.37	5.99	
Condensible particulate matter < 2.5 microns		Criteria	5.70E-03	#/MM Btu	B	1		4.10	17.98	4.10	17.98	
Total paticulate matter						1		5.47	23.97	5.47	23.97	
Total particulate matter < 10 microns		Criteria				1		5.47	23.97	5.47	23.97	
Total particulate matter < 2.5 microns		Criteria				1		5.47	23.97	5.47	23.97	
Sulfur dioxide	7446095	Criteria	6.00E-04	#/MM Btu	B	1		0.43	1.89	0.43	1.89	
Volatile organic compounds (as carbon)		Criteria	5.50E-03	#/MM Btu	B	1		3.96	17.34	3.96	17.34	
Volatile organic compounds (as VOC)		Criteria	5.50E-03	#/MM Btu	F	2.5		9.90	43.36	9.90	43.36	
Volatile organic compounds (sum of VOC)		Criteria			G	1		8.31	36.40	8.31	36.40	
Carbon monoxide		Criteria	8.40E-02	#/MM Btu	A	1		60.48	264.90	60.48	264.90	
Lead		Criteria	5.00E-07	#/MM Btu	B	1		0.00	0.00	0.00	0.00	
Nitrogen oxides		Criteria	2.80E-01	#/MM Btu	A	1		201.60	883.01	201.60	883.01	
Carbon dioxide	124389	GHG	5.30E+01	kg/MM Btu	I	1		84,158.73	368,615.24	84,158.73	368,615.24	
Biogenic carbon dioxide	124389	GHG				1		0.00				
Methane	74828	GHG, (112r)	1.00E-03	kg/MM Btu	I	1		1.59	6.95	1.59	6.95	
Nitrous oxide	10024972	GHG	1.00E-04	kg/MM Btu	I	1		0.16	0.70	0.16	0.70	
Carbon dioxide equivalent		GHG			J	1		84,241.27	368,976.76	84,241.27	368,976.76	
Chlorine dioxide	10049044	112r				1						
Sulfuric acid mist	7664939	TAP				1						
Hydrogen Sulfide	7783064	NSPS, TAP				1						
Total Reduced Sulfur (as TRS)		NSPS				1						
Total Reduced Sulfur (as Sulfur)		NSPS				1						
Total Reduced Sulfur (as Hydrogen Sulfide)		NSPS				1						
Total 112(b) Hazardous Air Pollutants								1.55	6.78	1.55	6.78	
8. REFERENCES:												
A) Emission factors from AP-42 for Uncontrolled Utility/Large Industrial Natural Gas-fired Boilers - Table 1.4-1.												
B) Emission factors from AP-42 for Uncontrolled Utility/Large Industrial Natural Gas-fired Boilers - Table 1.4-2.												
C) Emission factors from AP-42 for Uncontrolled Utility/Large Industrial Natural Gas-fired Boilers - Table 1.4-3.												
D) Highest emission factors from NCASI Technical Bulletin No. 650 (Table 4c), Natural Gas-fired Utility Boilers.												
E) All particulate matter assumed to be less than 2.5, per AP-42.												
F) Primary VOC assumed to be formaldehyde.												
G) VOC emissions are sum of individual speciated VOC.												
H) Emission factors from AP-42 for Uncontrolled Natural Gas-fired Boilers - Table 1.4-4.												
I) Emission factor for natural gas combustion in EPA MRR, Table C-1 and C-2.												
J) Emission factor based on GWP in EPA MRR, Table A-1.												
9. NOTES:												
Actual production is calendar year 2011 production rate.												
Actual production is calendar year 2005 production rate.												
Maximum production is permitted production rate.												
Total reduced sulfur emission are the sum of emissions of hydrogen sulfide, methyl mercaptan, dimethyl sulfide, and dimethyl disulfide.												
Process variability factors for metal compounds assume conversion of elemental metal to lowest state metal oxide, except HF.												

Table B-12
No. 2 Combination Boiler – No. 6 Fuel Oil Emission Calculations

1. & 2. PROCESS EMISSION SOURCE	MAXIMUM PRODUCTION	PRODUCTION UNITS	ACTUAL PRODUCTION	PRODUCTION UNITS	MAXIMUM HOURS PER DAY	MAXIMUM DAYS PER WEEK	MAXIMUM DAYS PER YEAR	ACTUAL DAYS PER YEAR				
Combination Boiler 2 - No. 6 Fuel Oil	700	MM Btu/hr	10	MM Btu/hr	24	7	365	358				
AEI Group ID = 008, Process Unit ID = 8												
Title V Unit ID = 08, Equipment ID = 3705												
			8. EMISSION FACTOR INFORMATION			PROCESS VARIABILITY FACTOR	CONTROL EFFICIENCY	6. MAXIMUM UNCONTROLLED EMISSIONS		7. MAXIMUM CONTROLLED EMISSIONS		
3. POLLUTANT	4. CAS #	5. TYPE	VALUE	UNITS	BASIS			(lb/hr)	(tons/yr)	(lb/hr)	(tons/yr)	
Filterable particulate matter			1.51E-01	#/MM Btu	K	1		105.43	461.79	105.43	461.79	
Filterable particulate matter < 10 microns		Criteria	1.07E-01	#/MM Btu	K	1		74.95	328.26	74.95	328.26	
Filterable particulate matter < 2.5 microns		Criteria	7.80E-02	#/MM Btu	K	1		54.62	239.24	54.62	239.24	
Condensible particulate matter < 2.5 microns		Criteria	1.00E-02	#/MM Btu	C	1		7.00	30.66	7.00	30.66	
Total paticulate matter								112.43	492.45	112.43	492.45	
Total particulate matter < 10 microns		Criteria						81.95	358.92	81.95	358.92	
Total particulate matter < 2.5 microns		Criteria						61.62	269.90	61.62	269.90	
Sulfur dioxide	7446095	Criteria	2.20E+00	#/MM Btu	A	1		1,538.60	6,739.07	1,538.60	6,739.07	
Volatile organic compounds (as carbon)		Criteria	5.07E-03	#/MM Btu	B	1		3.55	15.53	3.55	15.53	
Volatile organic compounds (as VOC)		Criteria	5.07E-03	#/MM Btu	M	2.5		8.87	38.84	8.87	38.84	
Volatile organic compounds (sum of VOC)		Criteria			N	1		0.41	1.81	0.41	1.81	
Carbon monoxide		Criteria	3.33E-02	#/MM Btu	A	1		23.33	102.20	23.33	102.20	
Lead		Criteria	2.80E-05	#/MM Btu	G	1		0.02	0.09	0.02	0.09	
Nitrogen oxides		Criteria	3.13E-01	#/MM Btu	A	1		219.33	960.68	219.33	960.68	
Carbon dioxide	124389	GHG	7.51E+01	kg/MM Btu	I	1		115,895.06	507,620.37	115,895.06	507,620.37	
Biogenic carbon dioxide	124389	GHG				1		0.00				
Methane	74828	GHG, (112r)	3.00E-03	kg/MM Btu	I	1		4.63	20.28	4.63	20.28	
Nitrous oxide	10024972	GHG	6.00E-04	kg/MM Btu	I	1		0.93	4.06	0.93	4.06	
Carbon dioxide equivalent		GHG			J			116,279.32	509,303.43	116,279.32	509,303.43	
Chlorine dioxide	10049044	112r				1						
Sulfuric acid mist	7664939	TAP	7.98E-02	#/MM Btu	L	1.23		68.43	299.72	68.43	299.72	
Hydrogen Sulfide	7783064	NSPS, TAP				1						
Total Reduced Sulfur (as TRS)		NSPS				1						
Total Reduced Sulfur (as Sulfur)		NSPS				1						
Total Reduced Sulfur (as Hydrogen Sulfide)		NSPS				1						
Total 112(b) Hazardous Air Pollutants								3.34	14.64	3.34	14.64	
8. REFERENCES:												
A) Maximum emission factors from AP-42 for Uncontrolled Residual Oil-fired Utility Boilers Table 1.3-1: assumes 2.1% S.												
B) Maximum emission factors from AP-42 for Uncontrolled Residual Oil-fired Utility Boilers - Table 1.3-3.												
C) Maximum emission factors from AP-42 for Residual Oil-fired Utility Boilers with ESPs Table 1.3-4: assumes 2.1% Sulfur.												
D) Maximum emission factors from AP-42 for Uncontrolled Residual Oil-fired Utility Boilers - Table 1.3-8.												
E) Maximum emission factors from AP-42 for Uncontrolled Residual Oil-fired Utility Boilers - Table 1.3-9 (PCDD is OCDD).												
F) Maximum emission factors from AP-42 for Uncontrolled Residual Oil-fired Utility Boilers - Table 1.3-11.												
G) Emission factor from U.S. EPA document "Estimating Air Toxic Emissions from Coal and Oil Combustion Sources" [EPA-450/2-89-001] for Uncontrolled Residual Oil-fired Utility Boilers (Table 4-1).												
H) Highest emission factors from NCASI Technical Bulletin No. 650 (Table 4b), Residual Oil-fired Utility Boilers.												
I) Emission factor for kerosene combustion in EPA MRR, Table C-1 and C-2.												
J) Emission factor based on GWP in EPA MRR, Table A-1.												
K) PM-10 and PM-2.5 ratio based on AP-42, Table 1.3-4.												
L) Maximum SO3 emission factor from AP-42 for Uncontrolled Residual Oil-fired Utility Boilers Table 1.3-1: assumes 2.1% S. Process variability factor adjusts SO3 to H2SO4.												
M) Primary VOC assumed to be formaldehyde.												
N) VOC emissions are sum of individual speciated VOC.												

Table B-13
No. 2 Combination Boiler – Tire Derived Fuel (TDF) Emission Calculations

1. & 2. PROCESS EMISSION SOURCE	MAXIMUM PRODUCTION	PRODUCTION UNITS	ACTUAL PRODUCTION	PRODUCTION UNITS	MAXIMUM HOURS PER DAY	MAXIMUM DAYS PER WEEK	MAXIMUM DAYS PER YEAR	ACTUAL DAYS PER YEAR			
Combination Boiler 2 - Tire Derived Fuel (TDF)	1.50	Ton TDF/hr	0.63	Ton TDF/hr	24	7	365	356			
AEI Group ID = 008, Process Unit ID = 11											
Title V Unit ID = 08, Equipment ID = 3705											
3. POLLUTANT	4. CAS #	5. TYPE	8. EMISSION FACTOR INFORMATION			PROCESS VARIABILITY FACTOR	CONTROL EFFICIENCY	6. MAXIMUM UNCONTROLLED EMISSIONS		7. MAXIMUM CONTROLLED EMISSIONS	
			VALUE	UNITS	BASIS			(lb/hr)	(tons/yr)	(lb/hr)	(tons/yr)
Filterable particulate matter			2.20E-06	#/MM Btu	D	1	99%	0.01	0.04	0.00	0.00
Filterable particulate matter < 10 microns		Criteria	2.20E-06	#/MM Btu	G	1	99%	0.01	0.04	0.00	0.00
Filterable particulate matter < 2.5 microns		Criteria	2.20E-06	#/MM Btu	G	1	99%	0.01	0.04	0.00	0.00
Condensable particulate matter < 2.5 microns		Criteria				1					
Total particulate matter								0.01	0.04	0.00	0.00
Total particulate matter < 10 microns		Criteria						0.01	0.04	0.00	0.00
Total particulate matter < 2.5 microns		Criteria						0.01	0.04	0.00	0.00
Sulfur dioxide	7446095	Criteria	1.40E-05	#/MM Btu	D	1		0.00	0.00	0.00	0.00
Volatile organic compounds (as carbon)		Criteria				1					
Volatile organic compounds (as VOC)		Criteria				1					
Volatile organic compounds (sum of VOC)		Criteria				1		0.01	0.04	0.01	0.04
Carbon monoxide		Criteria	7.20E-05	#/MM Btu	D	1		0.00	0.01	0.00	0.01
Lead		Criteria	3.44E-02	#/Ton TDF	A	1		0.05	0.23	0.05	0.23
Nitrogen oxides		Criteria	9.80E-05	#/MM Btu	D	1		0.00	0.02	0.00	0.02
Carbon dioxide	124389	GHG	8.60E+01	kg/MM Btu	E	1		284.29	1,245.20	284.29	1,245.20
Biogenic carbon dioxide	124389	GHG				1		0.00			
Methane	74828	GHG, (112r)	3.20E-02	kg/MM Btu	E	1		0.11	0.46	0.11	0.46
Nitrous oxide	10024972	GHG	4.20E-03	kg/MM Btu	E	1		0.01	0.06	0.01	0.06
Carbon dioxide equivalent		GHG			F			290.82	1,273.79	290.82	1,273.79
Chlorine dioxide	10049044	112r				1					
Sulfuric acid mist	7664939	TAP				1					
Hydrogen Sulfide	7783064	NSPS, TAP				1					
Total Reduced Sulfur (as TRS)		NSPS				1					
Total Reduced Sulfur (as Sulfur)		NSPS				1					
Total Reduced Sulfur (as Hydrogen Sulfide)		NSPS				1					
Total 112(b) Hazardous Air Pollutants								7.62	33.39	7.62	33.39
8. REFERENCES:											
A) Emission factor developed from Bowater stack test (3/1/2001).											
B) Emission factor from "Air Emissions from Scrap Tire Combustion" (EPA-600/R-97-115), Table 18 - Greater of 7%, 15%, 17%, or 19% TDF.											
C) Emission factor from "Air Emissions from Scrap Tire Combustion" (EPA-600/R-97-115), Table 19 - 100% TDF.											
D) Emission factor from "Air Emissions from Scrap Tire Combustion" (EPA-600/R-97-115), Table 21 - 100% TDF.											
E) Emission factor for tires combustion in EPA MRR, Table C-1 and C-2.											
F) Emission factor based on GWP in EPA MRR, Table A-1.											
G) PM-10 and PM-2.5 emissions assumed equivalent to TPM.											
9. NOTES:											
Actual production is calendar year 2011 production rate.											
Maximum production is maximum expected production rate.											
Total reduced sulfur emission are the sum of emissions of hydrogen sulfide, methyl mercaptan, dimethyl sulfide, and dimethyl disulfide.											
Process variability factors for metal compounds assume conversion of elemental metal to lowest state metal oxide, except HF.											